

What is claim is

1. A white light-emitting device, comprising
a light-emitting diode for emitting a first light with predetermined
wavelength; and

5 a phosphor receiving the light of the light-emitting diode and emitting a
second light of different wavelength for mixing with the first light and
forming a white light;

wherein the phosphor material has a general formula $(Y_xM_yCe_z)Al_5O_{12}$,
where $x + y = 3$, $x, y \neq 0$, $0.5 > z > 0$, and M is selected from the group
10 consisting of Tb, Lu, and Yb, with $(Y_xM_y)Al_5O_{12}$ serving as a host and Ce as
an activator, the ratio of M is adjusted to change a crystal field in the host
matrix, thus changing the wavelength of the second light.

2. The white light-emitting device as in claim 1, wherein the
light-emitting diode has a domination wavelength between 430 nm and 500
15 nm.

3. The white light-emitting device as in claim 1, wherein the phosphor
has a domination wavelength between 560 nm and 590 nm.

4. The white light-emitting device as in claim 1, wherein the phosphor is
made from a group consisting of metal oxide, nitrate, metal organic
20 compound and metal salt.

5. The white light-emitting device as in claim 1, wherein the phosphor is
made by a solid-state reaction process.

6. The white light-emitting device as in claim 1, wherein the phosphor is

made by a chemical process.

7. The white light-emitting device as in claim 6, wherein the chemical process is a citrate sol-gel process.

8. The white light-emitting device as in claim 6, wherein the chemical process is a co-precipitation process.

9. A phosphor used for a white light-emitting device and receiving a light with a first wavelength of the light-emitting diode and emitting light with a second wavelength different to the first wavelength and mixed with the light of the light-emitting diode to form a white light, the phosphor having a host matrix of $(Tb_xM_y)Al_5O_{12}$ and using Ce as activator,

wherein the phosphor material has a general formula $(Y_xM_yCe_z)Al_5O_{12}$, where $x + y = 3$, $x, y \neq 0$, $0.5 > z > 0$, and M is selected from the group consisting of Tb, Lu, and Yb, with $(Y_xM_y)Al_5O_{12}$ serving as a host and Ce as an activator, the ratio of M is adjusted to change a crystal field in the host matrix, thus changing the wavelength of the second light.

10. The phosphor as in claim 9, wherein the light-emitting diode has a domination wavelength between 430 nm and 500 nm.

11. The phosphor as in claim 9, wherein the phosphor has a domination wavelength between 560 nm and 590 nm.

20 12. The phosphor as in claim 9, wherein the phosphor is made from a group consisting of metal oxide, nitrate, metal organic compound and metal salt.

13. The phosphor as in claim 9, wherein the phosphor is made by a

solid-state reaction process.

14. The phosphor as in claim 9, wherein the phosphor is made by a chemical process.

15. The phosphor as in claim 14, wherein the chemical process is a citrate sol-gel process.

16. The phosphor as in claim 14, wherein the chemical process is a co-precipitation process.